(No Model.)

J. S. SELLON.

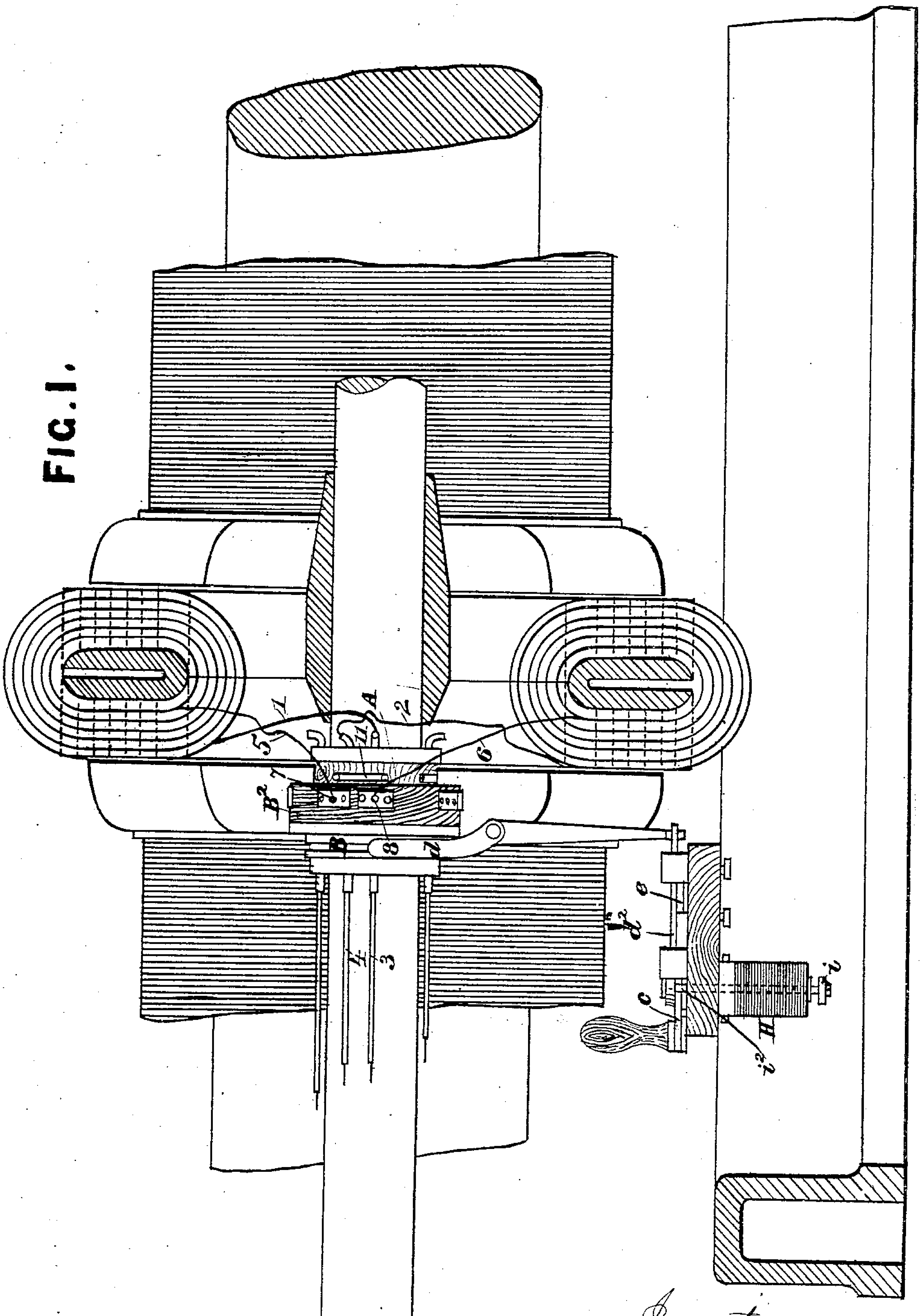
5 Sheets—Sheet 1.

DYNAMO ELECTRIC MACHINE.

No. 292,691.

Patented Jan. 29, 1884.

FIG. 1.



Attest:
Geo. T. Smallwood.
J. Henry Kaiser.

Inventor:
John S. Sellon
by A. Pollok
his attorney

(No Model.)

J. S. SELLON.

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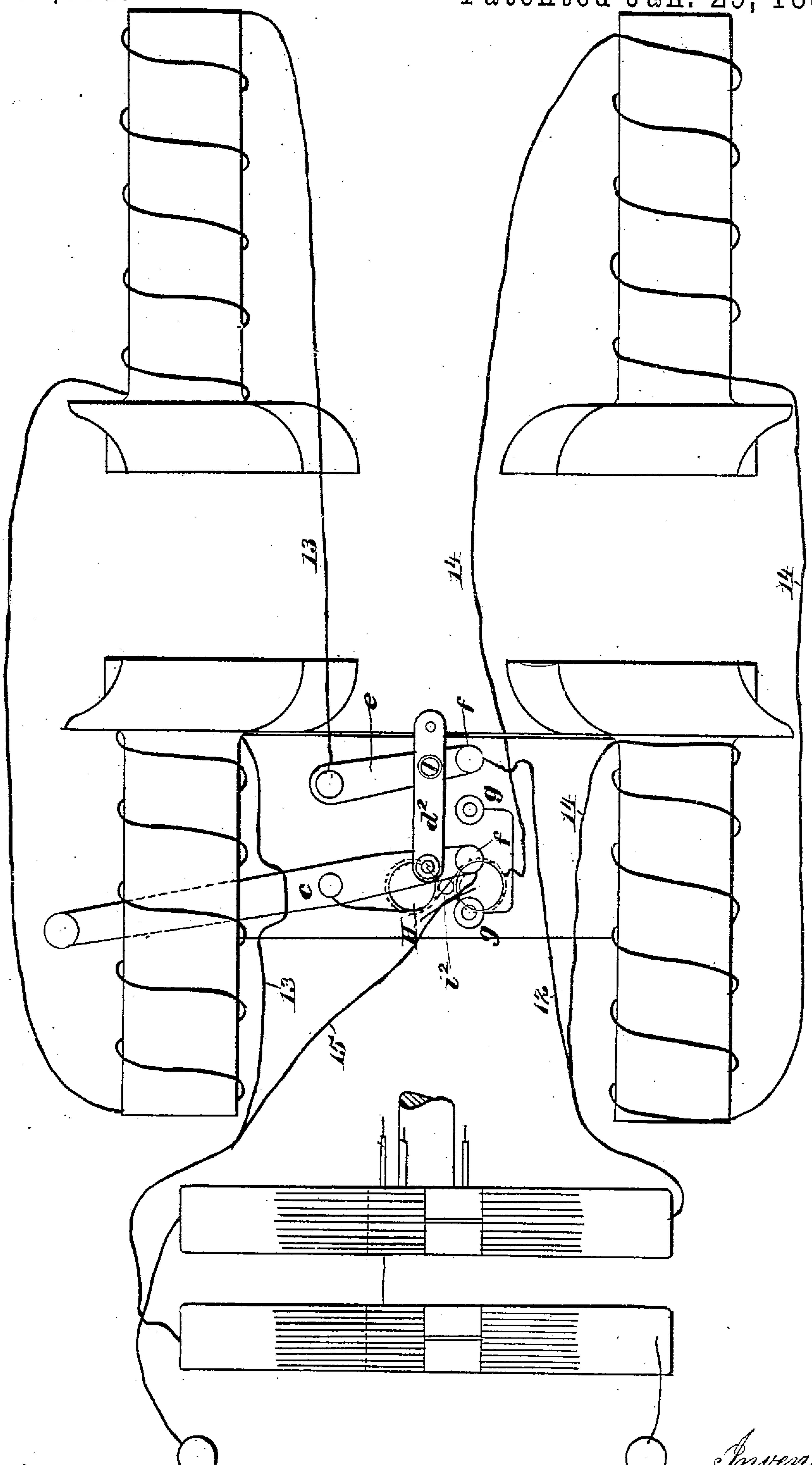
FIG. 2.



Attest.
Geo. T. Smallwood.
J. Henry Kaiser.

Inventor.
John S. Sellon
by A. Pollok
his attorney

N. PETERS. Photo-Lithographer. Washington, D. C.

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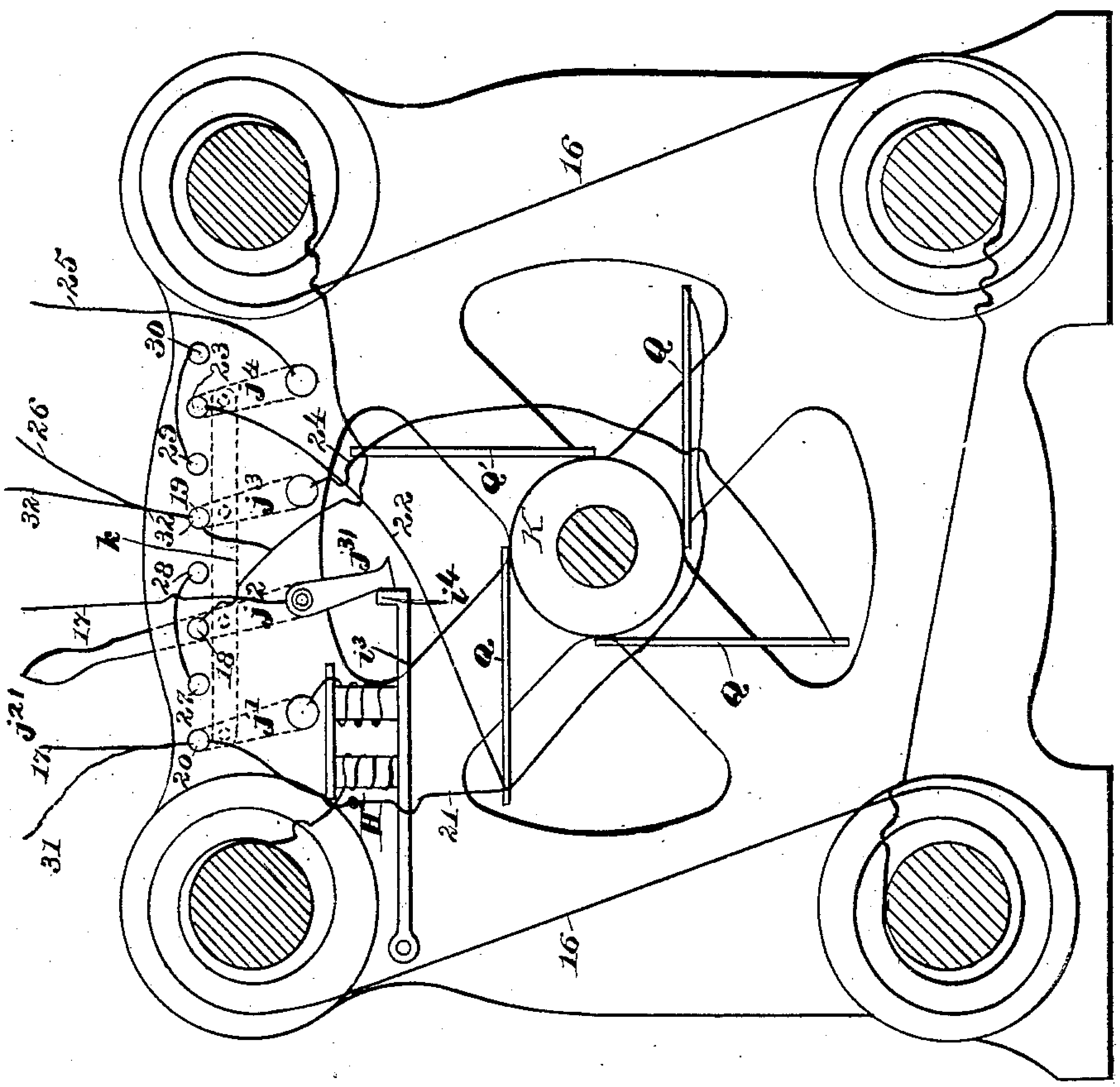
FIG. 3.



Attest:
Geo. T. Smallwood.
J. Henry Kaiser.

Inventor:
John S. Sellon
by A. Pollok
his attorney

N. PETERS, Photo-Lithographer, Washington, D. C.

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J. S. SELLON.

DYNAMO ELECTRIC MACHINE.

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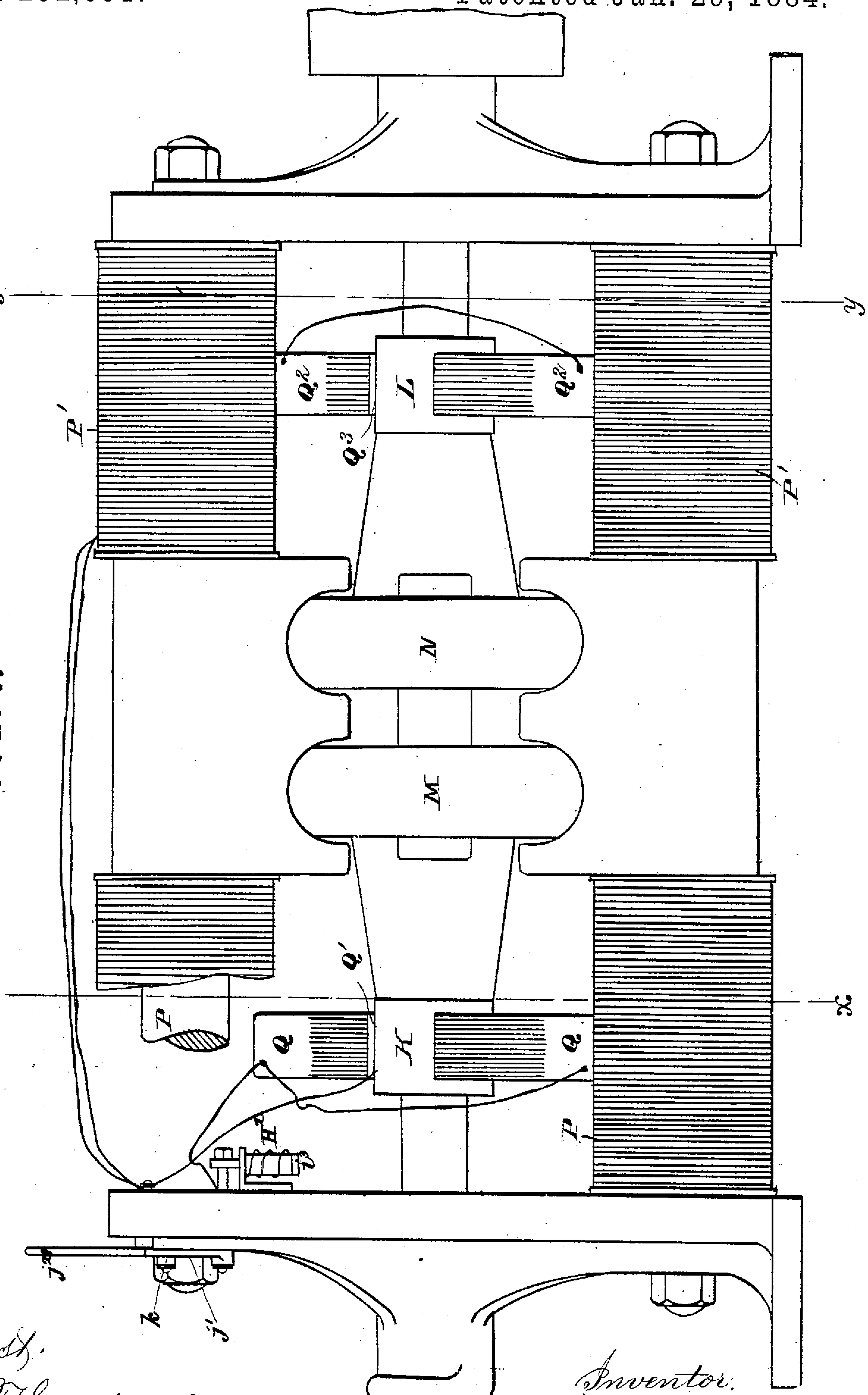
FIG. 4.



Attest.
Geo. T. Smallwood.
J. Henry Kaiser.

Inventor.
John S. Sellon
by A Pollok
his attorney

(No Model.) 5 Sheets—Sheet 5.

J. S. SELLON.

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Fig. 1a.

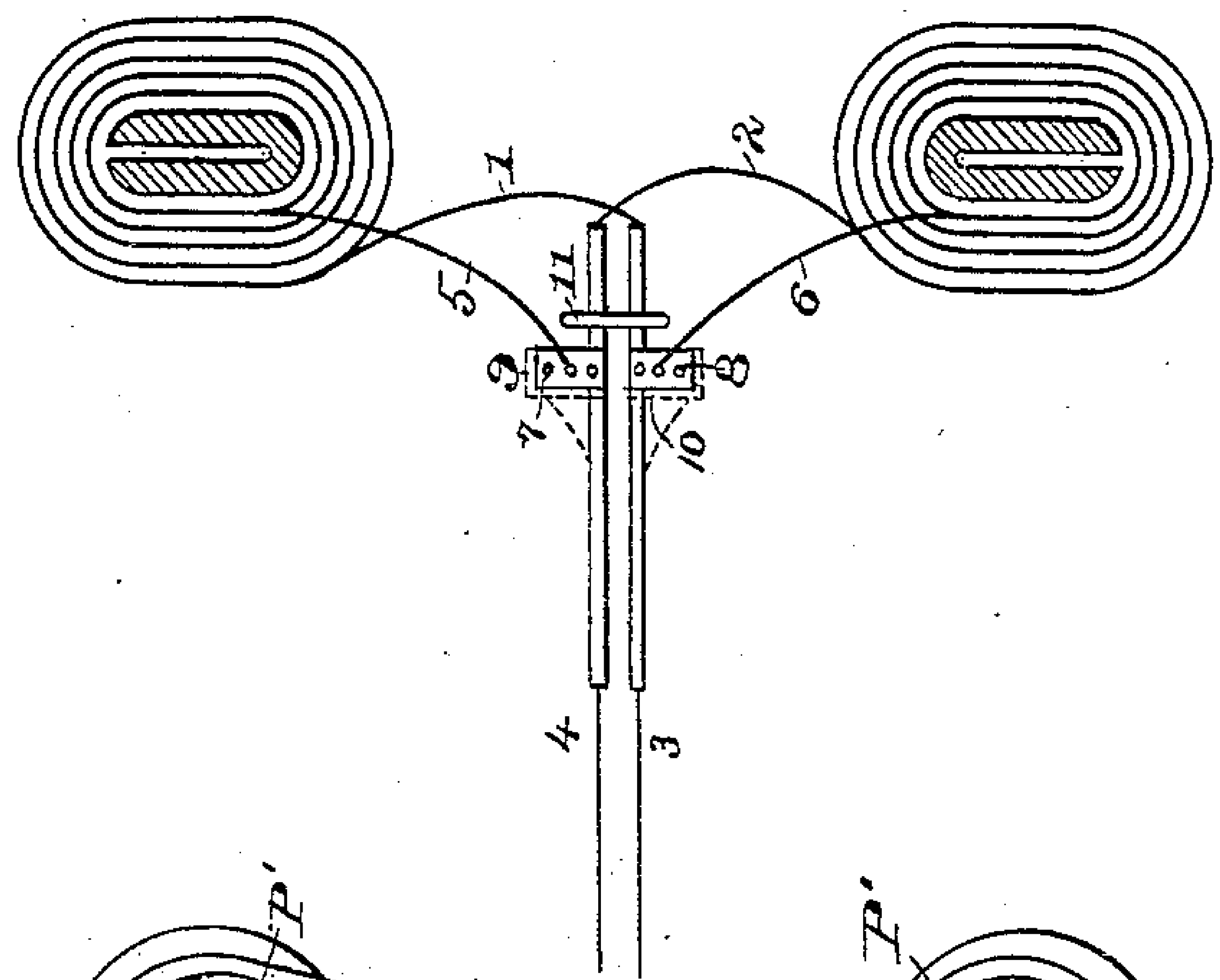
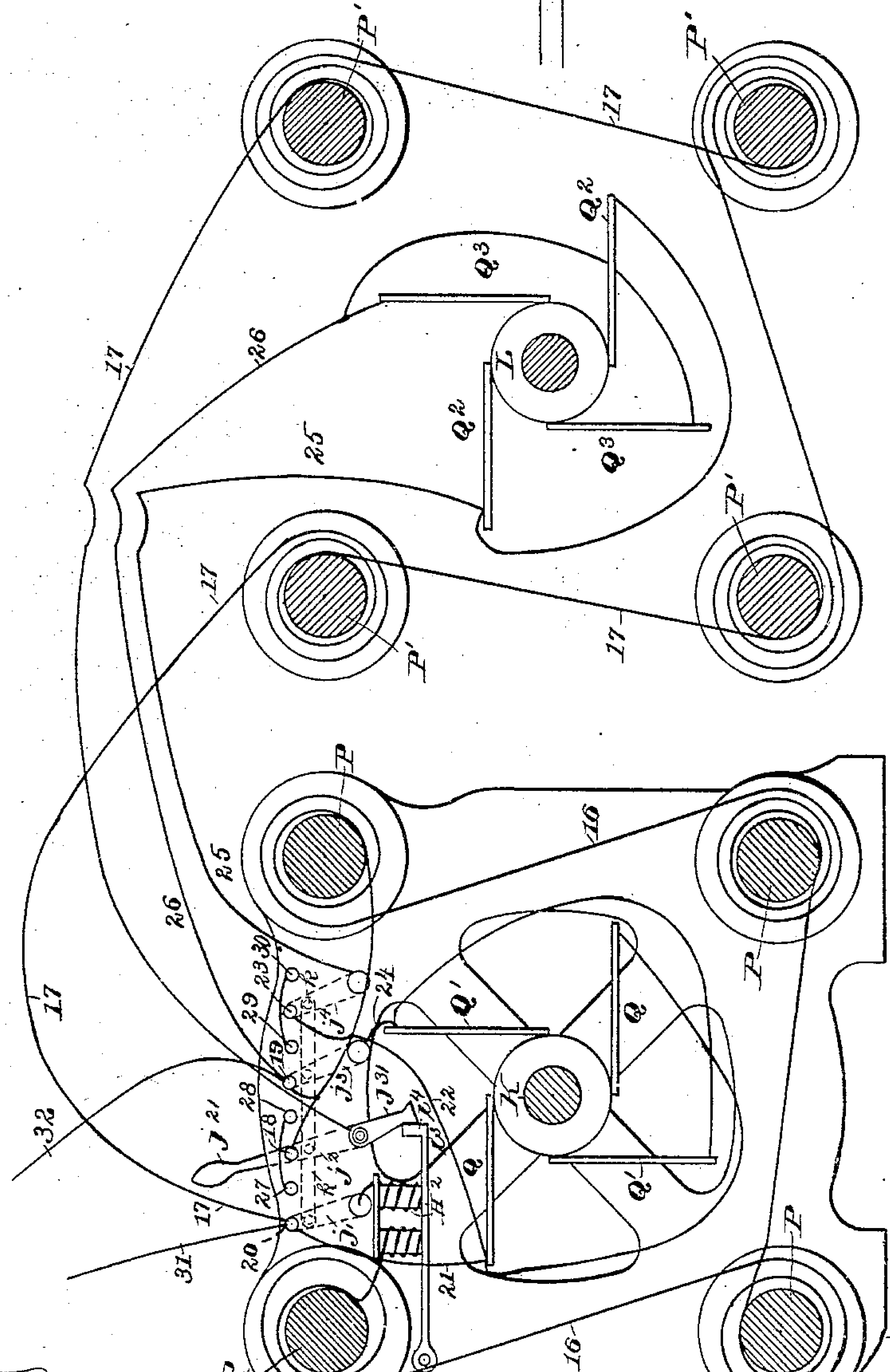


Fig. 3a.



Attest,
Wm J. Tanner
C. J. Hedrick

Inventor;
John S. Sellon by
A. Pollok his attorney

UNITED STATES PATENT OFFICE.

JOHN S. SELLON, OF HATTON GARDEN, COUNTY OF MIDDLESEX, ENGLAND.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 292,691, dated January 29, 1884.

Application filed July 14, 1883. (No model.) Patented in England January 13, 1883, No. 217; in Germany June 17, 1883, and in France June 20, 1883.

To all whom it may concern:

Be it known that I, JOHN SCUDAMORE SELLON, gentleman, a subject of the Queen of Great Britain, and residing at Hatton Garden, county of Middlesex, England, have invented certain Improvements in Dynamo-Electrical Machines, (for which I have obtained a patent in Great Britain, No. 217, dated January 13, 1883, and for which I have made applications in France, dated 20th of June, 1833, and Germany, dated June 16, 1883,) of which the following is a specification.

My invention has for its object to enable the same dynamo-machines to supply various strengths of current. I effect this by so arranging or attaching a switch that the bobbins or sections of wire on the armature can be placed in series or in parallel circuits with one another, or in any desired combination of the two; and the same movement which actuates this switch may also be made to move another switch to make the necessary change in the circuit of the field-magnets to suit the various requirements of strength of current. Thus a machine with a normal electro-motive force of, say, eight hundred volts, and a current of, say, ten ampéres may be changed so as to give an electro-motive force of, say, four hundred volts, and a current of twenty ampéres, and the switch or switches may be arranged so that one or more changes may be effected. To prevent accidents occurring from attempts being made to effect this change when the machine is running, the lever or bar by which the switches are actuated may be interlocked, so that it cannot be moved until the machine has ceased running, and this may be effected in various ways, either by mechanical arrangements—such as a small centrifugal governor, which locks it when the machine attains a certain speed—or, preferably, by a small electro-magnet, which locks it while any current is flowing in the circuit.

The accompanying drawings illustrate means by which my invention may be carried into effect.

Figure 1 is a sectional elevation, and Fig. 2 is a plan, of the lower part of a Brush dynamo-machine illustrating one method of effecting the purposes of my invention. Fig. 1^a is a diagram illustrating the contact-makers and circuit-connections of one pair of the armature-coils. Figs. 3 and 4 illustrate a modified form of the invention; and Fig. 3^a is a diagram showing the circuit-connections, the left hand of the figure being a section on line *x x*, Fig. 4, the plane of Fig. 3, and the right a section on line *y y*.

As represented in Figs. 1, 1^a, and 2, the shaft of the machine carries a collar of insulating material, A, upon which slides a sleeve, B, formed of insulating material at B^2. The said insulating-collar A and the insulating portion B^2 of the sleeve are provided with contact-pieces, so that when the sleeve is in one position the parallel circuit for the wires of the armature is completed; but when the said sleeve is shifted along the said collar-piece the contact-pieces leave those which give the parallel circuit and come in contact with others, which put the armature-coils in series. The sleeve B is moved by a lever, *c*, which is connected to the shifter *d* through the arm d^2, which latter is also connected to a pivoted arm, *e*, so that this latter arm and the lever *c* turn upon their centers in concert, so as to come into contact with the buttons at *f f* or *g*, *g*, to change the current through the field-magnet coils correspondingly to the change effected in those of the armature. The electro-magnet H is energized when the current is passing, and attracts a keeper, *i*, which causes a projecting pin, i^2, to be retained at the one side or the other of the lever *c*, according to the position it is in, so as to prevent the switch being operated while the current is passing.

The changes in the circuit-connections of the armature-coils will readily be understood from Figs. 1 and 1^a. For each of the four pairs of coils with which the armature of the Brush machine is provided there is a set of contact-makers, as shown in said figures for the single pair therein represented. The terminals 1 and 2 of the coils are connected with the wires 3 and 4, which lead to the proper commutator-sections. The other terminals, 5 and 6, instead of being permanently connected together, as usual, are led to the contact-pieces 7 and 8, carried by the sliding sleeve B. These contact-pieces extend through the insulating material B^2, and make contact inside the sleeve with the contact-plates 9 and 10, or the contact-strip 11, the said plates and the said strips being embedded in the insulating-collar A. The plates 9 and 10 are in permanent electrical connection with the wires 4 and 3, respectively. The strip 11 has no permanent electrical connection. When the sleeve B is in the position shown, the pieces 7 and 8 are in contact with the plates 9 and 10, respectively, so that the terminals 1 and 6 are connected with the wire 3 and the terminals 2 and 5 with the wire 4. The two coils are thus connected in parallel loops derived from the wires 3 and 4, the current flowing in opposite directions in the two coils. When, however, the sleeve B is shifted, the pieces 7 and 8 both make contact with the strip 11, so that the terminals 5 and 6 are connected with each other, and the coils are included in tension in the single loop. When the armature-coils of each pair are connected in parallel loops or branches, the field-coils are likewise connected in two parallel loops, one-half the current (see Fig. 2) passing by way of the wire 12, switch *e*, and wire 13, and the other half by way of the wire 14, coil of magnet H, switch *c*, and wire 15. When, however, the sleeve B is shifted, the switches *c e* are also shifted, the wires 12 and 13 are cut out, and the current for exciting the field passes through the wire 14, coil of magnet H, switch *c*, conductor connecting buttons *g g*, switch *e*, and wire 13. In Figs. 3, 3ª, and 4 a machine of the Gramme type, with two rings, M N, connected with the separate commutator-disks K L, two sets of four field-magnets, P P′, arranged to form two pairs of double or consequent poles, and four pairs of brushes, two pairs, Q Q′ and Q^2 Q^3, for each ring M N, respectively. The four magnets P are excited in a loop or branch, 16, which also includes the coils of the locking-magnet H^2, and the four magnets P are excited in a separate loop or branch, 17. When the two rings M N are connected in parallel circuits, the exciting-loops 16 and 17 are also connected in parallel circuits, and when the rings M N are connected in tension the loops 16 and 17 are also connected in tension. The change is effected by the switches J′ J^2 J^3 J^4, which are all connected by a rod, *k*, so that they can be simultaneously shifted by the handle j^{21}, or locked by the projection i^4 on the keeper i^3 of the electro-magnet H^2. When the current is passing, the keeper i^3 is attracted and the projection i^4 is in the path of the tail-piece j^{31}, and prevents the switches from being moved. When the current ceases or sufficiently weakens, the keeper drops away and withdraws the projection i^4, so as to allow the switches j' j^2 j^3 j^4 to be shifted. The terminals of loop 16 are connected, the one with the switch j' and the other with the buttons 18 and 19. The loop 17 terminates in the button 20 at one end and the switch j^2 at the other.

The brushes Q are connected with each other, and by the wires 21 and 22 with the buttons 20 and 23. The brushes Q′ are connected with each other, and by the wire 24 with the switch j^3. The brushes Q^2 are connected with each other, and by the wire 25 with the switch j^4, and the brushes Q^3 also with each other, and by the wire 26 with the button 19. The buttons 27 and 28 are permanently connected together by a wire, and so, also, are the buttons 29 and 30. The terminals 31 and 32 of the exterior circuit are connected with the buttons 20 and 19, respectively.

As shown, the two sets of field-magnets P P′ are included in parallel circuits, and the two rings M N are also included in parallel circuits.

The circuit-connections are as follows: beginning with the button 20 and ending with the button 19. This course will, for convenience, be followed as well for the armature as for the field-coils, it being understood that through both sets of field-coils said course is with the current, and through both rings or armatures against it. The circuit of magnets P is from button 20, through switch j', the coils of magnet H^2, and the wire 16 to the button 19; that of magnets P′ from the button 20, loop or wire 17, switch j^2, button 18, part of wire 16, to button 19; that of armature or ring M from button 20, wire 21, brushes Q, ring M, brushes Q′, wire 24, switch j^3, to button 19; that of armature or ring N from button 20, wires 21 and 22, button 23, switch j^4, wire 25, brushes Q^2, ring or armature N, brushes Q^3, wire 26, to button 19. When the switches are shifted, the two armatures or rings M N are connected in series, and so, also, are the two sets of field-coils P P′. The field-circuit (moving with the current) is then from button 20, by wire 17, switch j^2, buttons 28 and 27, switch j', magnet H^2, wire 16, to button 19. The armature-circuit (proceeding against the current) is from button 20, by wire 21, brushes Q, armature or ring M, brushes Q′, wire 24, switch j^3, buttons 29 and 30, switch j^4, wire 25, brushes Q^2, ring N, brushes Q^3, wire 26, to button 19.

Although to explain my invention I have shown arrangements for effecting two changes, it will be evident that upon the same principle any desired number of changes may be effected by obtaining contact-pieces to which the wires are led and corresponding contact-pieces on the movable switch to give the requisite circuits as the position of the switch is altered.

I claim—

1. The combination, with a dynamo-electric machine excited by current from its own circuit, of switch mechanism for connecting both the armature-coils and field-coils in parallel circuits or in series, substantially as described.

2. In an electrical machine provided with a switch between the armature-coils and commutator for connecting the armature-coils in tension or in series, according to the position of the contact-pieces of said switch, and in combination with the said armature-coils, commutator, and contact-pieces, an insulating-support common to one set of contact-pieces and movable with respect to the other con-

tact-pieces, so as to change simultaneously, by the same movement of said support, the electrical connection of the armature-coils, substantially as described.

3. In combination with the armature of an electrical machine, a switch carried by and revolving with said armature, and mechanism for operating the same while the armature is turning, substantially as described.

4. The combination, with the armature and field coils of a dynamo-electrical machine, of switch mechanism comprising contact-makers for changing the connection of the armature-coils and contact-makers connected with the former, to be operated simultaneously therewith for altering the connection of the field-coils, substantially as described.

5. The combination, with the coils of an electrical machine and a switch for altering the connection of the said coils, of an automatic lock for obstructing or permitting the movement of said switch, substantially as described.

6. In combination with a dynamo-electrical machine, a rotating and a non-rotating switch connected with each other for simultaneously altering the connection of the armature-coils and field-coils, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

Witnesses: JOHN S. SELLON.

CHAS. MILLS,

CHAS. JAS. JONES,

Both of 47 *Lincoln's Inn Fields, London.*